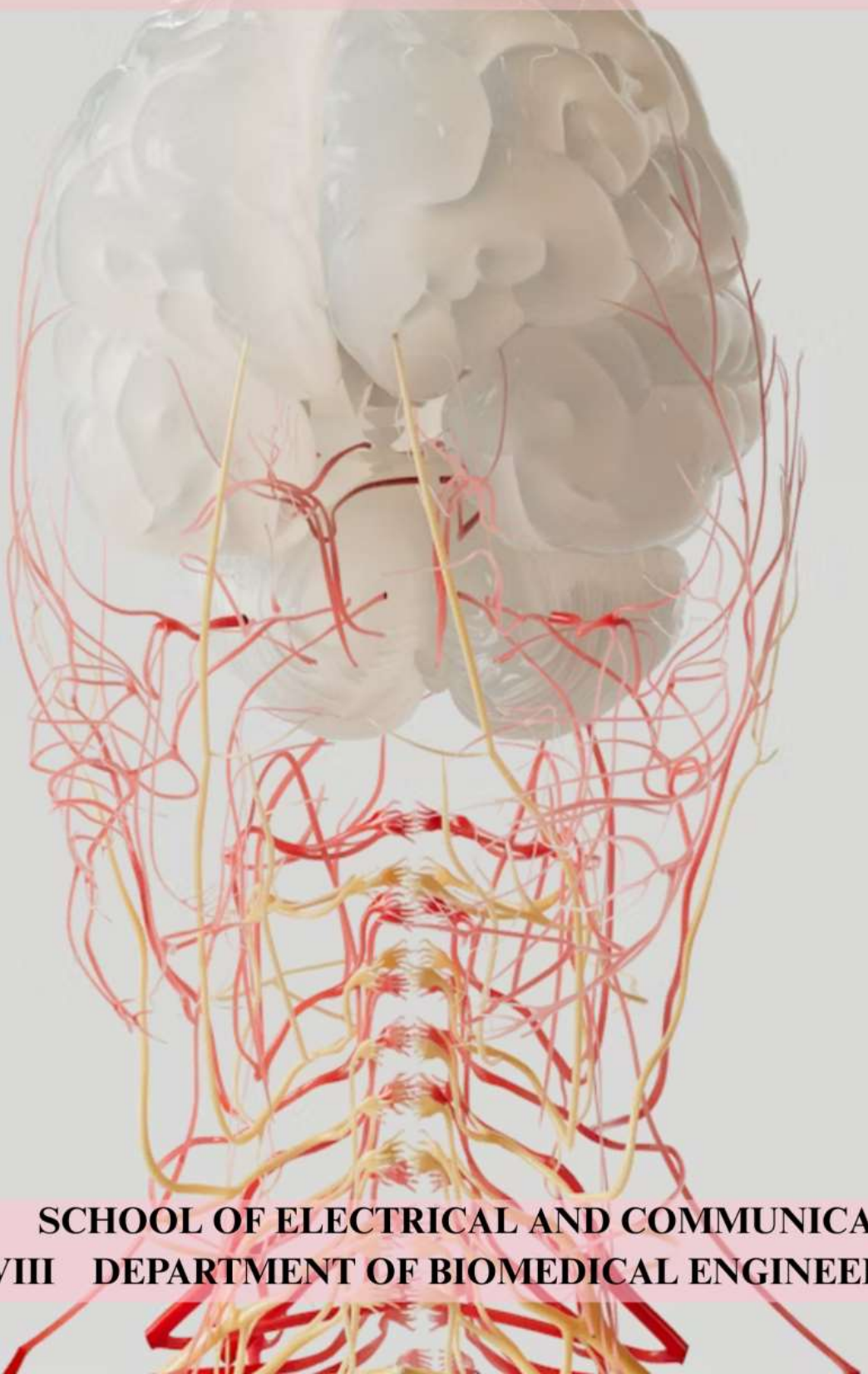
Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Recognised as CATEGORY-1 DEEMED TO BE UNIVERSITY by the UGC University Grants Commission

Accredited by NAAC with A++ HIGHEST GRADE

# BIOVERSE

## INNOVATING THE FUTURE OF LIFE AND MEDICINE



JAN 2025 SCHOOL OF ELECTRICAL AND COMMUNICATION
VOLUME VIII DEPARTMENT OF BIOMEDICAL ENGINEERING

## Institute Vision

To create, translate and disseminate frontiers of knowledge embedded with creativity and innovation for a positive transformation of emerging society.

## Institute Mission

M1: To nurture excellence in teaching, learning, creativity and research; translate knowledge into practice

M2: To foster multidisciplinary research across science, medicine, engineering, technology and humanities

M3: To incubate entrepreneurship; instill integrity and honour

M4: To inculcate scholarly leadership towards global competence and growth beyond self in a serene, inclusive and free academic environment

## Department Vision

To be recognized as an excellent centre in Biomedical Engineering for imparting quality technical education that leads to transformative advancements in healthcare industries

## Department Mission

M1: To infuse critical thinking skills by providing a strong foundation that enables the students for continuing education

M2: To create an ambience of academic excellence with state-of-the-art laboratories to compete globally

M3: To establish a dynamic research environment that integrates advanced healthcare technologies for innovation and progress

## Program Education Objectives

**PEO1:** **Exhibit proficiency in designing and analyzing healthcare solutions to cater to the needs of the medical industry and societal needs**

**PEO2:** **Demonstrate professional networking in a diverse team setting and collaborate among peers with ethical practices in the workplace, ensuring integrity**

**PEO3:** **Reinforce lifelong learning practices for professional advancement not limited to higher studies and research.**

## Program Special Outcomes

**PSO1:** **Apply critical reasoning to analyse, identify and solve solutions for problems related to Brain-Computer Interface (BCI)**

**PSO2:** **Design an effective interface between biological and electronic systems.**

**PSO3:** **Apply the knowledge of Artificial intelligence in healthcare engineering to solve real-time problems**

# Magazine Credits

**From the Magazine Team**

"This magazine is a celebration of people, ideas, and shared experiences. It represents the collective effort of a community that learns, grows, and innovates together throughout the academic year.

This edition highlights faculty insights, student achievements, technical advancements, and creative contributions that together capture the vibrant energy of our academic community. Each section reflects a commitment to knowledge, innovation, and personal growth, illustrating how diverse efforts come together to create a strong and dynamic learning environment. The magazine celebrates not only success stories but also the process of learning, experimentation, and perseverance that leads to them.

May this magazine serve as a reminder of the strength found in unity and the achievements made possible through teamwork

HAPPY READING!"

## Chief Editors :

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- S Nagendran (VTU19344) - IV BME
- Smriti Ghimire(VTU21477)- IV BME
- K Srinidhi (VTU19021) – IV BME

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Mr. A. Padmanabha Sarma

(Assistant Professor)

# CONTENTS:

# DEAN'S Desk

As we usher in the new year and unveil Volume 8 of our departmental magazine, I am struck by the profound evolution of the Biomedical Engineering department. In the short span of three years, this publication has grown into a vibrant archive of innovation and academic excellence.

The past year has marked an important phase of transformation for our institution, as we continue to evolve in response to the rapidly changing landscape of science, technology, and healthcare. Learning today extends far beyond classroom walls, and our academic ecosystem increasingly emphasizes real-world relevance, innovation, and societal impact. In this context, the role of Biomedical Engineering has become both significant and indispensable.

Our department has consistently demonstrated its ability to integrate emerging technologies with fundamental engineering principles. What is particularly commendable is their ability to translate theoretical knowledge into practical solutions that address real clinical challenges.u

This harmonious blend of academic excellence and social responsibility defines our institutional vision. I extend my sincere appreciation to the Department of Biomedical Engineering and the editorial team for their dedication in documenting these achievements. As we reflect on the milestones of 2024, may this edition inspire our community to pursue greater innovation, deeper collaboration, and a renewed commitment to advancing healthcare in the year ahead.

**Prof. Dr. R S Valarmathi**

**Dean- School of Electrical & Communication**

# HoD'S Reflection

As we step into the new year and release Volume 8 of our departmental magazine, it is inspiring to reflect on the significant journey of the Biomedical Engineering department. Within just three years, this magazine has grown into a vibrant platform highlighting innovation and academic achievement.

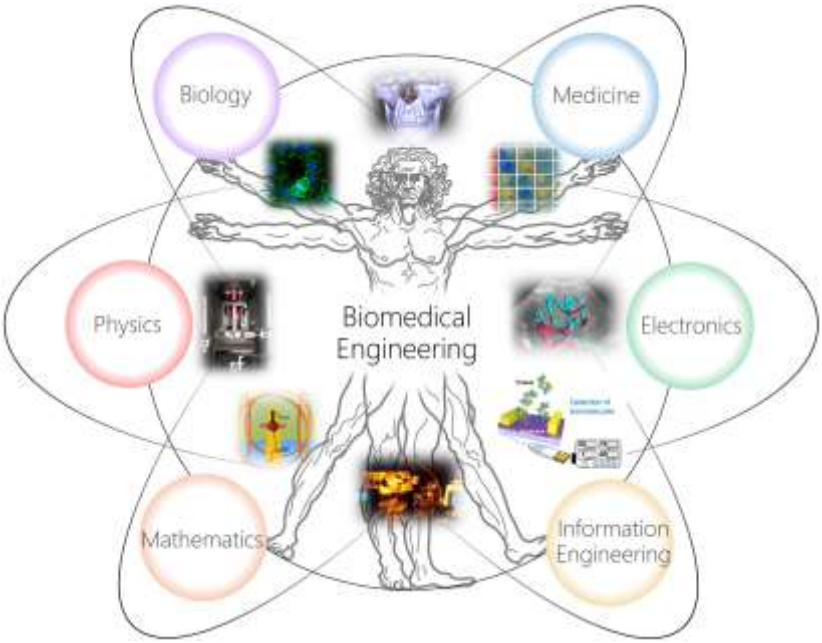
Introducing this issue of our department magazine fills me with a deep sense of accomplishment. This edition is not just a record of events, but a narrative of growth—one that reflects the hard work, resilience, and creativity demonstrated by our students and faculty throughout the academic period.

The department has consistently encouraged learning beyond textbooks, fostering an environment where ideas are explored, questions are welcomed, and innovation is nurtured. The pages that follow offer a glimpse into this journey, showcasing academic excellence, technical initiatives, and creative expressions that highlight the evolving identity of our department.

May this volume serve as both a reflection of past efforts and a source of motivation for future endeavors. I sincerely commend the editorial team for their commitment in compiling this meaningful representation of our department's progress.

**Dr. Balasubramaniam. D**

# About the Department




The Department of Biomedical Engineering was established in the year 2017 with the objective of bridging engineering principles with medical and biological sciences to address challenges in healthcare. The department offers B.Tech. and Ph.D. programs, aimed at developing skilled professionals and researchers capable of contributing to healthcare technology, medical device development, and biomedical research. Emphasis is placed on outcome-based education, hands-on learning, and research-oriented training. With a focus on emerging areas such as medical imaging, biomechanics, biomedical signal processing, and artificial intelligence in healthcare, the department strives to produce graduates who are industry-ready, research-driven, and socially responsible.

# Eye Camp

The Department of Biomedical Engineering at Vel Tech organized a free eye screening camp on August 9th and 10th at the university campus as part of its community outreach and healthcare awareness initiatives. The main objective of the camp was to promote awareness about eye health and provide basic eye care services to students, faculty members, staff, and people from nearby communities.

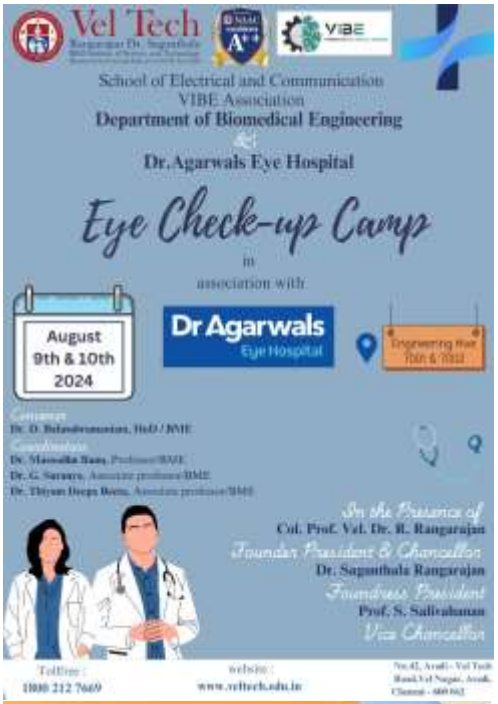
The camp was conducted with the support of experienced ophthalmologists and medical professionals from a reputed eye hospital. During the camp, several eye examinations were carried out including vision screening, eye pressure testing, and detection of common eye problems such as refractive errors, cataracts, dry eye issues, and other vision-related conditions. Participants were also given suggestions on maintaining proper eye care, healthy lifestyle habits, and reducing eye strain caused by prolonged use of digital devices.

Biomedical Engineering students and faculty members played an important role in organizing the event. Students assisted in registration of participants, maintaining medical records, guiding patients to different screening sections, and supporting doctors during eye examinations. This hands-on involvement helped students understand real-time medical screening procedures and the importance of biomedical technology in healthcare services.

The camp also included awareness sessions on the importance of regular eye check-ups, early detection of vision problems, and preventive eye care practices. Informational guidance was provided to participants regarding proper nutrition, eye exercises, and protective measures to maintain good vision.

Overall, the eye camp benefited many individuals by providing free consultation, early diagnosis of eye conditions, and

# Eye Camp


Vel Tech
School of Electrical and Communication
VIBE Association
Department of Biomedical Engineering
&
Dr. Agarwals Eye Hospital
Eye Check-up Camp
in
association with
August
9th & 10th
2024
Dr Agarwals
Eye Hospital
In the Presence of
Col. Prof. Vel. Dr. R. Rangarajan
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# News in Trend- GraphNoVo

Machine learning is now helping researchers analyze the makeup of unfamiliar cells, which could lead to more personalized medicine in the treatment of cancer and other serious diseases.

Researchers at the University of Waterloo developed GraphNovo, a new program that provides a more accurate understanding of the peptide sequences in cells. Peptides are chains of amino acids within cells and are building blocks as important and unique as DNA or RNA.

In a healthy person, the immune system can correctly identify the peptides of irregular or foreign cells, such as cancer cells or harmful bacteria, and then target those cells for destruction. For people whose immune system is struggling, the promising field of immunotherapy is working to retrain their immune systems to identify these dangerous invaders.

To quickly build a profile of the peptides in an unfamiliar cell, scientists have been using a method called de novo peptide sequencing, which uses mass spectrometry to rapidly analyze a new sample. This process may leave some peptides incomplete or entirely missing from the sequence.

**GraphNovo** represents a paradigm shift in **immunopeptidomics** by leveraging deep learning to overcome the limitations of traditional mass spectrometry data analysis. It uses a graph-based approach to predict the missing pieces of the biochemical puzzle with high fidelity. This precision allows researchers to identify specific neoantigens in cancer cells that are unique to an individual patient, effectively providing a roadmap for the immune system to target tumors. By bridging the gap between raw data and actionable clinical insights, this AI-driven tool accelerates the design of personalized vaccines and immunotherapy treatments, marking a significant milestone in the convergence of computer science and molecular biology.

# News in Trend- Smart Patches

The emergence of multi-biomarker microneedle patches marks a transformative step toward continuous, non-invasive health monitoring. These patches utilize microscopic needles that penetrate only the outermost layer of the skin—reaching the interstitial fluid without triggering the pain receptors located deeper in the dermis. By integrating multiple electrochemical sensors into a single one-centimeter square device, the patch can simultaneously track glucose and ketone levels, providing a comprehensive view of metabolic health that a single-marker test cannot offer. The seamless integration with smartphone technology via Bluetooth allows for real-time data visualization and emergency alerts, empowering patients with conditions like Type 1 diabetes to manage their health with greater precision and far less discomfort than traditional finger-prick methods.

**Smriti Ghimire(VTU21477)**

# Best Project

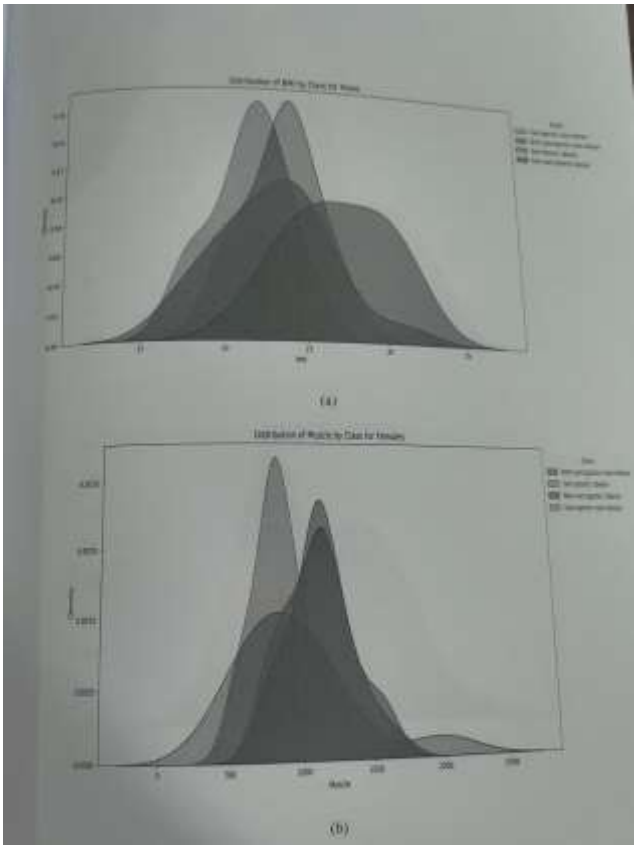
## Body composition based classification of Sarcopenia from thigh MR scans

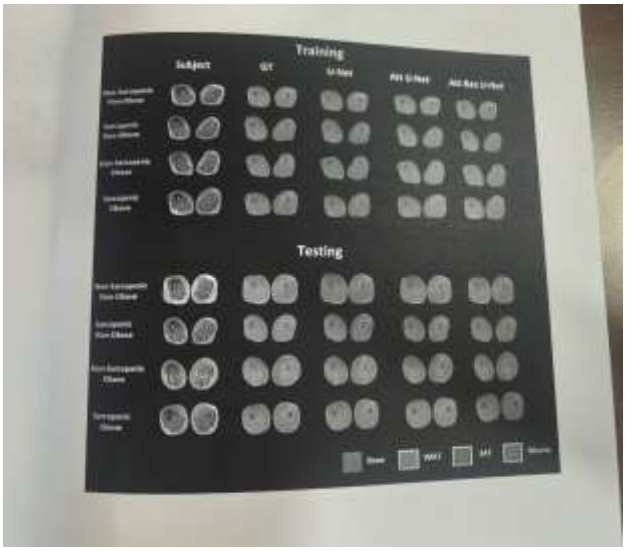
The project titled “Body Composition Based Classification of Sarcopenia from Thigh MR Scans” focuses on analyzing thigh MRI images to identify and classify sarcopenia using deep learning techniques. Sarcopenia is a medical condition characterized by the loss of skeletal muscle mass and strength, commonly seen in elderly individuals and patients with chronic diseases. Early detection of sarcopenia is important because it can lead to mobility problems, metabolic disorders, and reduced quality of life. In this project, thigh MR scans are used because MRI provides clear and high-resolution images of soft tissues such as muscle, fat, and bone. The MR images are first enhanced using image enhancement techniques to improve the signal-to-noise ratio and contrast-to-noise ratio, which helps in better visualization of anatomical structures.

After preprocessing, deep learning models based on the U-Net architecture are applied to segment different body tissues from the MRI images. The models used in this study include U-Net, Attention U-Net, and Attention Residual U-Net, which are widely used for medical image segmentation. These models help in identifying and separating important components such as bone, muscle, subcutaneous adipose tissue (SAT), and intermuscular adipose tissue (IMAT) from the thigh MRI scans. The dataset is divided into training and testing sets so that the models can learn from labeled data and accurately predict tissue segmentation. The performance of these models is evaluated using metrics such as Dice similarity index and Hausdorff distance to measure the accuracy of segmentation.

# Best Project

Based on the extracted features such as muscle mass and body composition, the system classifies individuals into four categories: non-sarcopenic non-obese, sarcopenic non-obese, non-sarcopenic obese, and sarcopenic obese. Graphical analysis of BMI and muscle distribution is also used to understand the differences between these groups. The results show that advanced models such as Attention Residual U-Net provide improved segmentation accuracy compared to the basic U-Net model. Overall, this project demonstrates how artificial intelligence and medical imaging techniques can be used to automatically analyze body composition and assist doctors in the early detection and classification of sarcopenia.






Pittu Pallavi (VTU19829)

# Alumni Spotlight

Returning to the campus that once shaped her aspirations, **Vidhyadarshini** shared reflections that were both inspiring and deeply meaningful. She spoke not only about her achievements after graduation, but also about the journey that shaped her—from the challenges and late-night preparations to moments of self-doubt that ultimately strengthened her confidence and determination.

She reflected on how the university experience went far beyond classrooms and examinations. For her, the campus was a place where resilience was built, friendships were formed, and the foundations of her professional life were laid. Through academic projects, internships, technical activities, and guidance from faculty mentors, she developed the skills and perspective that continue to support her career today.

While interacting with the juniors, Vidhyadarshini encouraged them to remain curious, stay consistent in their efforts, and view failures not as obstacles but as valuable learning experiences. She advised students to make the most of every opportunity available during their academic journey and to never hesitate to ask questions or explore new ideas.

Her message emphasized that success is not defined by perfection, but by persistence and dedication. By sharing her experiences and lessons learned, Vidhyadarshini left the students with a renewed sense of motivation—reminding them that with passion, patience, and continuous effort, every dream has the potential to become reality.

**Girish Varma R**

# Gallery